

IN THE UNITED STATES PATENT AND TRADEMARK  
OFFICE

In re Application of

Sumie SUDA, et al.

Serial No. 10/550,019

Group Art Unit: 1793

Filed: September 23, 2005

Examiner: Fogarty

For: SPRING STEEL EXCELLENT IN SAG RESISTANCE AND  
FATIGUE PROPERTY

DECLARATION UNDER 37. C.F.R. 1.132

HONORABLE COMMISSIONER OF PATENTS AND  
TRADEMARKS

ALEXANDRIA, VIRGINIA 22313-1450

Sir:

Now comes Sumie SUDA, a citizen of Amagasaki-shi,  
Hyogo-ken, Japan, who declares and states:

1. That I graduated from the Faculty of Engineering of  
Nagoya Institute of Technology in the year 1993.
  
2. That I have worked in KOBE STEEL LTD. for 16 years in  
the field of steel rod and steel wire.

### 3. SUBJECT MATTER OF EXPERIMENTS

That I have conducted the following experiments to clarify that the spring steel satisfying the following formula (2) has the superior fatigue life to the spring steel not satisfying the following formula (2):

$$(0.8 \times [\text{Si}]) + [\text{Cr}] \geq 3.0 \quad \dots (2).$$

### 4. EXPERIMENTAL REPORT

#### (I) Method:

The fatigue lives until breakage of examples 1 to 11 in the specification were measured under the rotary bending fatigue test condition of a rotational speed of 4,000 rpm, a test piece length of 600 mm and a nominal stress of 826 MPa.

#### (II) Results

The results of the experiments are shown in Table 1' with fatigue lives of examples 12 to 19 in Table 1 of the specification.

Table 1'

Examples	Calculated 0.8Si+Cr	Fatigue life ( $\times 10^6$ cycles)
1	3.1	46
2	2.8	35
3	4.3	50
4	3.5	50
5	3.2	48
6	3.9	50
7	2.7	33
8	3.0	45
9	3.1	48
10	3.3	50
11	2.6	28
12	1.9	5.0
13	1.8	7.8
14	2.1	7.0
15	2.5	10.3
16	2.1	4.3
17	2.4	1.7
18	2.5	8.3
19	2.2	12.7

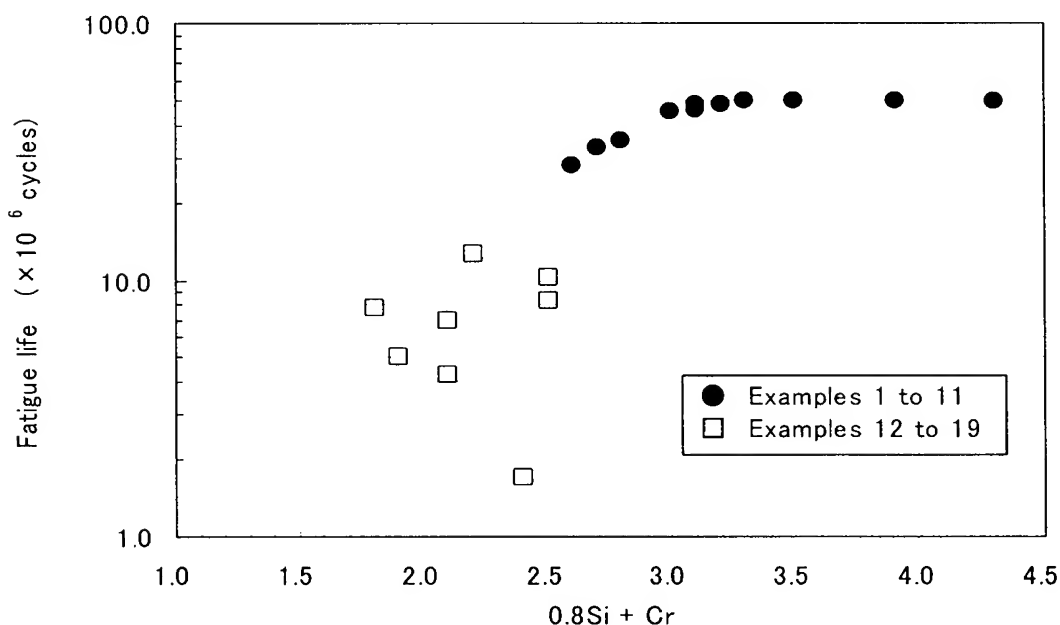
### (Ⅲ) Consideration

FIG. A shows the relationship between “Calculated 0.8Si+Cr” and “Fatigue life” of examples 1 to 19. Examples 1 to 11 with ● in FIG. A have better fatigue lives than examples 12 to 19 with □ in FIG. A. Examples 1 to 11 satisfy the formula (1) in the specification, examples 12 to 19 do not satisfy the formula. Further, examples 1 to 11 are classified into two groups on the basis of their fatigue lives. One group is examples 2, 7 and 11, whose fatigue life is  $20 \times 10^6$  to  $35 \times 10^6$  cycles; the other group is examples 1, 3 to 6 and 8 to 10, whose fatigue life is greater than or equal to  $45 \times 10^6$  cycles. The

former group satisfies the formula (1) but does not satisfy the formula (2); the latter group satisfies the formula (2).

Accordingly, 3.0 for the value of  $(0.8 \times [\text{Si}]) + [\text{Cr}]$  is the critical value for the fatigue life of spring steel, the spring steel satisfying the following formula (2) has the superior fatigue life to the spring steel not satisfying the following formula (2).

FIG. A



The undersigned Petitioner declares further that all statements made herein of her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made

are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Further declarant saith not.

Respectfully submitted,

Date: March 11, 2009

Sumie Suda  
Sumie SUDA